

# **STORM WATER MANAGEMENT PLAN**

## **PROCEDURES, FORMAT & GUIDELINES**

June 17, 2002  
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City of Kansas City, Missouri  
Public Works Department  
Engineering Division  
Development Services

### **PART I – DRAINAGE STUDY**

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# **STORM WATER MANAGEMENT PLAN**

June 17 2002

## Section 100      General

100.1 Introduction: This is the City of Kansas City, Missouri (City); City Planning and Development Department Land Development Division; Development Services, Storm Water Management Plan – Procedures, Format & Guidelines. This document applies to all proposed developments to be reviewed by Land Development Division, and is presented to clarify the specific submittal requirements for a storm water drainage study used to establish designs and/or evaluate types of drainage systems or facilities ordinarily encountered in local urban, suburban and/or critical storm drainage areas. More specialized circumstances may arise which require other methods, techniques or strategies not ordinarily encountered. It is not the intent that this document be restrictive in any manner to the needs created by special and/or site specific circumstances.

These procedures, format and guidelines supersede all previous documents prepared by Land Development Divisions, or Development Services (formerly identified as the Development Assistance Group), addressing the preparation of drainage studies. However, in the event any requirement of this document conflicts with any ordinance or other City requirement, that which imposes the highest standard shall control.

**100.2 Purpose:** The primary purpose of this document is to standardize and clearly define the requirements for a complete and acceptable storm water drainage study submittal. Additionally, it is hoped that a study prepared and submitted in accordance with this document will reduce the time required for review, eliminate the need for several resubmittals, enhance the developer's understanding of the improvements and documentation required, and assure equitable requirements being imposed on all developments.

This document establishes minimum performance standards pertaining to procedures, format and guidelines for a storm water management plan "drainage study" to be reviewed by Development Services. However, for various reasons, the study may deserve a level of attention and professionalism exceeding the minimum imposed by this document and other governing criteria.

The accepted and approved storm water drainage study will become a City record along with all review documentation available for public use.

### **100.3 Definitions:**

**Analyze:** In a complete and detailed format, discuss, examine, evaluate and present the considerations (pro and con) regarding the problems or items involved.

**Clarify:** In narrative form, recount, characterize or relate information.

**Macro Study:** A storm water drainage study for a multiphase development addressing the major potential problem areas (e.g. flood prone areas, etc.) issues, (e.g. any adverse impacts, etc.), and primary system components, (e.g. detention basin, BMP's, etc.); and also establishing the overall strategy and the phasing of, the storm water management plan to address quantity and quality of stormwater discharges.

**Micro Study:** A storm water drainage study for an individual site, or a site located within a multiphase development for which a macro study has been completed; addressing all site specific potential problem areas, issues and primary system components, and when appropriate, identifying the applicability of, and conformance with, the macro study.

**Private Systems:** Systems, structures, components or elements; not conveying public water and not having tributary boundaries which cross a lot, property, track, right-of-way (R/W), or ownership line. Generally, private systems are those, which manage or convey drainage from only one (1) property, lot or ownership; are privately maintained and the conveyance systems specifications are governed by applicable building codes (i.e. Uniform Building Code, BOCA, etc.).

**Public Systems:** Systems, structures, components or elements; conveying or managing public water and/or having tributary boundaries, which cross a lot, property, tract, right-of-way (R/W), easement or ownership line, (i.e., natural unimproved channels, enclosed systems within public R/W or easement, regional stormwater management facilities to treat and manage the peak flow and volume discharged, etc.).

**Public Water:** Storm water runoff which crosses more than one lot, property or tract.

**Project:** Any site involving the construction, reconstruction, or improvement of structures and/or grounds.

**Storm Water Drainage Study (Drainage Study):** A report, sealed by a Missouri registered professional engineer, complete in its entirety, technical in nature yet containing a fully descriptive narrative; addressing all storm water drainage considerations for a subject project.

**Storm Water Management Plan:** Comprised of three parts, establishes and documents the design for controlling runoff (flow rates, volumes, and quality) from the development: Part I – Drainage Study, Part II – Erosion and Sediment Control Plan, Part III – Construction Plans.

**100.4 General Requirements:** The storm water drainage study shall describe, analyze, clarify, summarize, record, and quantify all storm drainage considerations associated with the subject project. Quantitative results shall be summarized and supported by computations using approved methodology. Detailed quantitative results and conclusions shall be presented to clearly ascertain all areas of conformance and non-conformance with the adopted criteria. Conclusions and recommendations shall be appropriately justified.

In accordance with the Excerpts from the Registration Law Concerning the Practice of Engineering – Missouri Revised Statutes, Chapter 327, (RSMo) and the Rules of Missouri Board for Architects, Professional Engineers and Land Surveyors (Rules) the storm water drainage study shall be performed by a Registered Professional Engineer (Engineer of Record), or person under the Immediate Supervision Requirements as identified in Chapter 13 of the Rules. Refer also to RSMo, Chapter 327.181 and 4 CSR 30-2.010 of the Rules.

The Engineer of Record shall affix his/her original seal to the report, at a minimum, on the title or cover sheet, providing that the signed title or cover clearly indicates all of the sheets (pages, maps, exhibits, etc.) contained in the report. Refer to 4 CSR 30-3.030 Para. 3 of the Rules.

The Engineer of Records shall be completely familiar with all Kansas City, Missouri (KCMo) adopted sections of the Kansas City Metropolitan Chapter of the American Public Works Association – Standard Specifications and Design Criteria: Division II, Construction and Material Specification, Section 2600, Storm Sewers and Division V, Design Criteria, Section 5600, Storm Drainage Systems and Facilities, including all effective and most recent KCMo supplements.

NOTE: APWA, as used in this document, shall be understood to include KCMo supplements.

**100.5 Other References:** These procedures and guidelines have been prepared as a complement to the current adopted criteria. When conflicts are encountered, the most rigorous criteria shall govern. Other Codes, Standards, and agencies have criteria and regulations pertaining to storm water management which may further complement these procedures and guidelines, including, but not limited to, the following:

**Kansas City Metropolitan Chapter of the American Public Works Association – Standard Specifications and Design Criteria:** Division II and V, including all KCMo supplements.

**City of Kansas City, Missouri – Erosion and Sediment Control Specifications:** as approved by the Missouri Department of Natural Resources.

**Manual of Best Management Practice for Stormwater Quality – August 2009** second edition.

**FEMA – Managing Floodplain Development in Approximate Zone A Areas:**  
A guide for obtaining and developing base (100 year) flood elevations.

**FEMA – Procedures for Compliance with Floodway Regulations.**

**Uniform Building Code “U.B.C.” or National Building Code “N.B.C.”**

**KCMo Plan Presentation Criteria**

**KCMo Standard Supplements as contained in the Internet FTP Site**  
<http://www.kcmo.org/engineering>

**Codes Submittal Requirements and Publications.**

**Storm Water Utility – KCMo Code of Ordinances Chapter 63**

**KC-One Report**

## **Section 200 PROCEDURES**

**200.1 Transmittals:** Transmittal letters or forms accompanying drainage study submittals or correspondence from the City on reviews may contain general information recommendations, such as project status (i.e., resubmittal, final approval submittal, related submittal schedules, status of approvals by other agencies or parties, etc.); general coordination information (i.e., City reviewer, A/E Project Engineer contact, relevant agency contact persons, etc.), general summary, and conclusions, etc. However, any summary and/or conclusion statements by the applicant must also be included within the body of the report document.

Reports should be bound appropriate for purpose of duplicating, recording and filing. Three ring binders are discouraged due to problems with filing, as are permanent bindings that hinder reproduction.

Drainage studies to be submitted to **Public Works, Engineering Division, Development Services (City Engineering)** are those associated with a plat and/or with construction plans for public improvements. When submitting directly to Public Works two (2) copies of the sealed report, amendment or supplement, at least one of which bears an original seal which will be refined for City filing (inconsistent with Codes requirements below) are required for review. Information received by facsimile does not constitute an official submittal and in all cases it is necessary that two (2) copies, as described above, be transmitted to City Engineering. Upon receipt of the two sealed copies the documents will be logged in for review and can be tracked via KivaNet.

Drainage studies to be submitted to the Codes Administration Department (DCA) are those associated with a building plan being submitted to Codes for review, and which

may be associated with a plat. When submitting to Codes three (3) copies of the sealed report, amendment or supplement, all bearing an original seal, are required for review. Include a request with the Codes transmittal that two (2) copies of the study be forwarded to Public Works – City Engineering. (See attached checklist application and routing sheet for detailed instructions.)

Refer to the Codes plan submittal requirements for additional information, which may be pertinent to the submittal application process.

**200.2 Initial Submittals:** The initial storm water drainage study submittal shall be fully complete, shall address coordination with off-site municipalities, present all issues of conformance and non-conformance with governing criteria including, but not limited to, such primary issues as the applicability of previously accepted studies (regarding whether they still conform with current criteria, apply, etc.), and comparisons (that clearly define) the need for storm water detention, etc.

**200.3 Resubmittals:** Resubmittals shall completely address all City review comments and shall also include a sealed cover letter stating how each of the comments were addressed. The sealed title or cover sheet shall include the date of the report revision together with an explanation of same. Also, refer to rules contained in 4 CSR 30-3.030 Para. 3. Resubmittals will adhere to the City review response time published in the Benchmark Service initiatives effective June 1, 2002.

**200.4 Amendments and Supplements:** Amendments and supplements to the Drainage Study shall be sealed by the Engineer of Record. The original seal shall appear on the title or cover sheet and shall include the date and number of the amendment or supplement and shall clearly indicate all of the sheets (pages, maps, exhibits, etc.) contained therein. The amendment or supplement shall also include a copy of the original report cover and the sheet(s) from that report displaying the seal of the Engineer of Record and the original report contents that were changed.

**200.5 Rejections:** Incomplete and returned submittals: Storm water drainage study submitted by non-registrants, that do not meet the requirements, contained herein, submittals which are not sealed by a Registered Professional Engineer, and/or those deemed incomplete or inadequate by the City Engineer will be rejected and returned with written comments by the City reviewer. (See QCR Checklist, Content Checklist, and Review Checklist requirements.)

**200.6 Coordination:** Discussion and coordination on decisional matters related to the contents of the Drainage Study with the City will be conducted with the Engineer of Record, and not solely with his/her employee or other duly appointed representative.

## **Section 300 FORMAT**

The following format establishes minimum requirements for a drainage study to be reviewed by Development Services. While it is recognized that some duplication of

APWA 5600 plan requirements does occur in this section, this shall in no way be construed to lessen the performance or preparation requirements of either criteria. The Study shall not be hand written!

**300.1 Report Cover:** The report cover shall contain the following information:

- a) Report Title – “Storm Water Drainage Study,” with the word “Macro” preceding “Storm ...” when appropriate.
- b) Project name or the plat name and phase.
- c) Date the report was prepared and all subsequent revision dates.
- d) For whom the report was prepared, including address and phone number (and e-mail address if available).
- e) By whom the report was prepared, including address and phone number (and e-mail address if available).

**300.2 Table of Contents:** A table of contents shall be included in all reports to clearly indicate the full content of the report. The table of contents shall include the name and number of each section and/or exhibit/attachment contained in the report with the total pages/sheets comprising the section and/or exhibit/attachment identified.

The general order of the report body and exhibits/attachments shall be as follows:

- 1. Report Cover
- 2. Table of Contents
- 3. General Information
- 4. Methodology
- 5. Existing Condition Analysis
- 6. Proposed Condition Analysis
- 7. Summary (including BMP Worksheets)
- 8. Conclusions & Recommendations
- 9. Supporting Calculations
- 10. Maps & Exhibits

**300.3 General Information:** The following shall be included in the General Information section:

- a) Description of the project including plat or project name and phase, development type (i.e., commercial, residential, light/heavy industrial, etc.), City Development case number or plat number, etc.
- b) Location defined by the Kiva Parcel Id's (see QCR Checklist for procedure to obtain Id's over the internet).
- c) Project location description.
- d) Watershed or tributary branch name (see QCR Checklist for instructions).
- e) Site acreage matching the plat or property legal description as appropriate.
- f) Location map of adequate scale identifying the project site, suggested size is 8-1/2" X 11".
- g) Plat copy, 8-1/2" X 11" and matching the transparency copy provided to City Development, if said development is being platted.



- h) Soil type and condition (if soil type and/or condition are to be used as documentation).

**300.4 Methodology:** This section shall convey and document the methodology followed (i.e., the general design approach), including the methods employed (e.g. rational, SCS TR-55, HEC-1, HEC-HMS, PSRM, TR-20, etc.) and basis, during preparation of the report. (See also APWA or other supplements.)

Acceptable, appropriate and industry standard methodology and methods, meeting the “City Standards” and subject to approval of the City Engineer, shall be used.

Program assisted computations used to perform calculations for specific components (i.e., SCS TR-55, Pondpack, etc.) shall be appropriately documented, including author and date, and when not a commonly accepted “City Standard,” shall also provide the background documentation of the method(s) employed.

It is not acceptable to use different methods to evaluate similar components within a study, nor is it acceptable to mix methods inappropriately during evaluation of a single system component.

The Modified Rational, or similar methods, used for computation of storm water detention volume and routing are **not** acceptable to the City. Rational Methods shall only be used on system components with tributary areas less than or equal to 5 acres.

**300.5 Existing Condition Analysis:** The following shall be included and/or addressed in the Existing Condition Analysis section:

- a) Perform site investigation, survey, etc., and identify and describe the existing site and surrounding area storm drainage conditions.
- b) Identify and determine, through research of available City and adjoining municipality records, the existence of site and surrounding macro/master studies (drainage or otherwise), land use plans, conditions and/or systems which may be affected, impacted or have an effect on the proposed development.
- c) Describe, analyze and review the existing storm water runoff conditions at the site and in the surrounding area, including the flow quantity and characteristics, to determine the existing impacted systems and their adequacy using APWA Section 5600 and other applicable City criteria and standards.
- d) Determine and identify all issues of non-conformance with the adopted criteria, including, but not limited to, conditions associated with existing public or private systems.
- e) Prepare and include an existing conditions drainage area map, displaying the delineated existing drainage area(s) and all other information necessary for confirmation of the existing conditions analysis (i.e., existing structure size, flowline elevations, existing channels and ditches, with slope, etc.

- f) Quantitative analysis, results, and conclusions are required for all of the above, and must be supported by attached and clearly referenced computations using approved methodology.

**300.6 Proposed Condition Analysis:** The following shall be included and/or addressed in the Proposed Condition Analysis Section:

- a) Identify and describe all changes as a result of the proposed site and surrounding area storm drainage conditions.
- b) Describe, analyze, clarify, and review the proposed storm water runoff conditions at the site and in the surrounding area and watershed, including the flow quantity and characteristics, to determine the existing impacted systems and their adequacy using APWA Section 5600 and/or other applicable governing criteria (i.e., FEMA guidelines, City standard drawings, etc.)
- c) Determine and identify all issues of non-conformance with the adopted criteria, including, but not limited to, conditions associated with the existing as well as the proposed public or private systems.
- d) Prepare and include a proposed conditions drainage area map, displaying the delineated proposed drainage area(s) and all other information necessary for confirmation of the proposed conditions analysis (i.e., proposed structure size, flowline elevations, proposed channels and ditches, with slope, etc.)
- e) Quantitative analysis, results and conclusions are required for all of the above in accordance with this document, and must be supported by attached computations using approved methodology.

**300.7 Summary:** The summary shall provide in narrative form a condensed version of the main points and/or facts, with all details, illustrations, and elaborations omitted. At a minimum, the following shall be included/addressed:

- a) Project name and extent of proposed development.
- b) Adequacy of the existing system to convey existing site runoff.
- c) The effect of other studies and plans on this study.
- d) Major components of the storm water management plan established by the study.
- e) Requirements for storm water detention (provision of, or waiver request and justifications) including water quality level of service worksheet computations and results.
- f) Implementation schedule for the plan (i.e., with 1<sup>st</sup> phase, after XX acres developed, etc.).
- g) Special circumstances.

**300.8 Conclusions & Recommendations:** The conclusions and recommendations of the report shall be stated in narrative form. At a minimum, the following shall be documented:

- a) Whether or not there are any adverse impacts to the receiving system(s).

- b) Whether or not there are any areas of non-conformance with the governing criteria.
- c) The appropriateness and effectiveness of the established storm water management plan.
- d) Any potential public and/or property endangerment resulting from failure of the plan or any system component.

**300.9 Maps & Exhibits:** Maps and exhibits shall be included in the report such that the report is complete in its entirety, a stand-alone document independent of the development/improvement plans.

Maps and exhibits shall clearly convey all information required by previous sections of these guidelines, and also all information referenced by the report (i.e., areas, runoff coefficients, systems, structures, storm water detention basins, flood level delineations, headwater elevations, etc.).

Each page/sheet of the maps and exhibits shall include the title, page/sheet number and the number of pages/sheets comprising the map and/or exhibit.

All maps and exhibits shall be referenced in the appropriate section of the report narrative by title and the purpose of providing the calculations shall be clearly stated.

**300.10 Supporting Calculations:** Supporting calculations and computations shall be provided for all data contained in the report including calculations/computations for: time of concentration, runoff, routing, capacity of critical system components, etc.

Each page of the supporting calculations and computations shall include the title, page number and the number of pages comprising the set of calculations.

All supporting calculations shall be referenced in the appropriate section of the report narrative by title and the purpose of providing the calculations shall be clearly stated.

Supporting calculations and computations shall be complete, legible and follow a logical trail.

## **Section 400 GUIDELINES**

**400.1 Purpose:** The following subsections of Section 400 Guidelines contain general information relevant to the previous sections of this document and should be followed in the performance of this document.

**400.2 Research:** Research of available City or adjoining municipality records shall be conducted as necessary to determine site and surrounding master studies (drainage or otherwise), land use plans, conditions, and/or systems which may be affected, impacted, or have an effect on the proposed development. This effort is strictly the responsibility of the submittee, and may require coordination with several City, State, and Federal

departments or agencies. Please note, it is not the City's responsibility to conduct research outside of the context of records contained within each department. However, the City can assist in describing the various types of available City records to be referenced or used, contact the Land Development Division, Development Services, permit Section, for additional assistance (816) 513-2551. The Permit Section also retains copies of records and distributes copies of all current APWA adopted KCMo supplements. See also <http://www.kcmo.org/engineering> for adopted standards.

**400.3 Project Managers:** Architects who will act as the project managers should consult with their retained engineer during the preliminary phases of design so that all drainage issues and conditions can be addressed during project formulation and prior to final submission.

**400.4 Private Building Improvement Plan Submittals:** In accordance with the governing regulations, Building Improvement-Plan submittals, which propose or include small or large storm improvements must also address their site drainage issues and confirm with these guidelines in order that increment development and ultimate final developed conditions will result in appropriate drainage conditions and management plans. Building plans on small sites not classified as "Developments" by the APWA Section 5600 definition requirements, are not exempt and must still clearly present their case as well as documenting development areas, drainage areas, runoff coefficients, and resultant non-impacting conditions for record (i.e., by a registered P.E.). See APWA Section 5601.2 H.3. The 10% will be computed using the original approved plan condition against the total of all subsequent improvements, and the 0.5 acre requirement shall be relative to the total property ownership, lot, tract, or development limits. Again, the burden of proof for acceptance of the proposal shall be on the design engineer. Please reference the CODES PLAN SUBMITTAL REQUIREMENT DOCUMENT for other specific site plan requirements, which may be pertinent to these types of submittals.

**400.5 Development Type Generalizations:** The following general types of developments typically require unique and sometimes special analysis, strategies, procedures or approaches, which are generally categorized below. For additional information contact Public Works, Engineering Division, Manager of Development Assistance Group, at (816) 513-2547 or the Chief Review Engineer, at (816) 513-2559. Reviews and/or approvals can only be based on complete submittals conforming to the requirements of this document.

- a) Rural and Undeveloped Areas:
  - i) Meet requirements of APWA Section 5600
  - ii) Submit "Macro Study" per platting requirements
  - iii) Analyze enclosing and/or improving existing natural unimproved Conveyance elements
  - iv) Analyze existing critical conveyance elements
  - v) Address Floodplain delineations and issues
  - vi) Etc.

- b) Urban areas:
  - i) See a) above
  - ii) Evaluate appropriate issues relating to more recent criteria changes or impacts as a result of previously designed conveyance components.
  - iii) Address specific approval requirements for special drainage districts, areas, or systems (only non0-standard item?)
  - iv) Utilize previous or existing studies and enabler???studies.
  - v) Etc.
- c) Large-Ongoing Development Areas:
  - i) See a) and b) above
  - ii) May require research of previous studies, improvements, or continuation of previous design approaches and studies (all projects required per 300.5 b).
  - iii) Etc.
- d) Special Storm Water Damage or Flood Hazard Areas:
  - i) See all of the above
  - ii) Additional requirements may be appropriate or required
  - iii) Address special designs methods or analysis precedence already established.
  - iv) Etc.

Note: The Engineer of Record should be familiar with these and/or any special engineering expertise related to special project circumstances before attempting to provide services (preparing a drainage study for development) in these areas. Otherwise, the resultant submittal may be substantially incomplete and rejected or total project approval time may be lengthened due to significant number of resubmittal attempts.

**400.3 Alternate Solutions:** Alternate solutions may exist for some of the projects. Other projects or sites may have site constraints, which limit the available solutions to only a few, or even one acceptable engineering standard solution that will satisfy the City criteria requirements. It is not the intent of this document to restrict the possible available solutions, but only to provide a consistent and uniform logic guide by which to establish a solution.

For example, some projects may only be acceptable if detention is provided. Ultimately, the burden for this determination and analysis resides with the design engineer hired by the developer and not the City. Additionally, in order for the City to record and review the engineer's determination and recommendations generally requires that all components of this document be presented. It is the Engineer's professional ethics obligation to protect the general safety and welfare of the public. It is the City's intent to facilitate this intent.

By APWA criteria, the minimum discharge rate for the project site is to be limited to 1.8 cfs/acre, for the 100-year storm event (i.e., a rate approximately equivalent to the 10-year undeveloped runoff condition). The criterion implies that this is an absolute maximum. In some instances, less restrictive or more restrictive requirements may be appropriate. Due diligence, analysis, and documentation are appropriate and required in order to establish or recommend other rates (See APWA supplements for additional criteria and guidance).

In all instances, it is the design engineer's responsibility to provide the information, which is not normally presented on the plans. Alternate approaches will commonly be based on either a) an engineered design which meets City criteria, b) the hydrologic and hydraulic responses of the watershed impacted by the development, or c) more restrictive state or federal requirements (floodplain, environmental constraints, etc.).

Issues of feasibility, cost, present conditions, etc., may have a bearing on the ultimate approval or non-approval decision by the City. However, the City cannot vary from the minimum criteria or necessary criteria, based solely on these issues, especially if there is potential for compromising our primary obligation to the safety, health, property and welfare of the public. Some alternatives which have occurred are:

- i) Improvements in the downstream inadequate system(s).
- ii) Provide on-site detention storage.
- iii) Provide additional detention storage greater than the required minimum.
- iv) Provide integrated regional watershed solution.
- v) Phase needed improvements over the total development.
- vi) Justify adequacy and criteria conformance of the downstream system.
- vii) Provide waiver documentation showing that the site improvements will not adversely impact downstream system components or properties.
- viii) Combination of above.

Note: For all, the proposal submission documentation shall be in accordance with the procedures, format and guidelines sections of this document.

**400.4 Simplified Volume:** If detention is proposed and the storm water detention volume requirement is approximated using the "Simplified Volume" chart approach routing of the design storm through the facility is still required in order to a) provide complete design data, b) to verify that it will function as intended and c) to determine acceptability compared to the existing system analysis results. Reference APWA 5606.4.C.1, 5606.6 B., 5606.7 "Required Submittals". Most computer assisted programs recognized by the engineering community, as acceptable standards will provide the output information required by the criteria. If this information is not provided, the submittal will be considered incomplete.

**400.5 Unacceptable System Components:** Combination systems are highly suspect systems, which are normally considered inadequate. Proper verification of these existing systems, flows and capacities based on actual rather than assumed intake structures and/or service connection is especially important in modeling and

analyzing the actual capacity and response of these systems for acceptance. Lines eight (8) inches and smaller are not acceptable for connection by proposed storm sewer improvements regardless of the conditions. Some acceptable alternative must be presented. Likewise, existing private systems, which a) may have acceptable capacities after development, b) are requested to be, or required to become, public systems after development, but c) do not meet current APWA Division II specification requirements, are not acceptable or approvable, as the City does not want to be ultimately responsible for maintenance of facilities which do not meet the minimum design specification references. All possibilities relating to unacceptable systems cannot be clarified here, but this points out that all possible issues and circumstances must be presented and considered in the initial design approach.

400.6 Special Funded Projects: Some specially funded projects may require the City to provide a letter confirming availability and adequacy of the receiving facilities (sanitary and storm systems, etc), after final City approvals are given, for use by the financing agency. It should be understood that the proposed conditions analysis, as well as the entire report and plans, form the basis for these adequacy approvals and thus require that the studies be submitted in conformance with this document. Again, the burden of proof of availability and adequacy is on the design engineer not the City.

400.7 Macro Studies: Macro studies should be submitted as part of the 1<sup>st</sup> Plat study when required due to multiple phasing of the project and/or or when required by the platting conditions.

The Proposed Conditions Analysis aspect of Macro studies are for establishing, strategies, phasing major drainage issues and boundaries, types of improvements, limits of the future development limits and level of criteria conformance) i.e., macro in nature). Generally, the when and where storm water management facilities will be constructed.

The depth of this detail may increase if other municipalities, corporate entities, etc., effected by the development require more restrictive conformance conformation, which again should be submitted with the initial submittal. These situations will be approached on a case-by-case basis. The engineer has the responsibility for, and is encouraged to, coordinate with these entities prior to formal submittal to KCMo.

Also, please note that future platting requirements will be impacted by the Macro proposal.

400.8 Small Sites: A detention waiver may be requested for projects on small sites, less than ½ acre, provided the following conditions are met and documented in a drainage study.

a) The historical use of the land shall be comparable to the proposed use.

- b) A detention basin would not feasibly operate as intended and/or provide a significant benefit to the existing drainage system, which must be discussed and presented in the study.
- c) The project must not be considered a development by the definition contained in the Kansas City, Missouri, Division V, “Design Criteria”, Section 5600 “STORM DRAINAGE SYSTEMS AND FACILITIES”, Section 5601.2 H, including all supplements.
- d) There can be no change in the characteristics of how the runoff leaves the site such that it would not cause or continue to cause a significant adverse impact to a downstream property or public system.
- e) On site collections must be accomplished in accordance with applicable Code (BOCA, UBC, etc.) while meeting the above criteria.
- f) On site private systems shall convey the storm and sanitary flows from the site in separate systems.

400.8 BMP Threshold: See supplement proposal submitted to Standards Committee for status of adoption of minimum disturbance area threshold that must occur on new or redevelopment before the Water Quality BMP requirements become a mandatory component of the design.

#### **DISCLAIMER OF LIABILITY**

The procedures, format and guidelines set forth herein establish minimum requirements which must be implemented with good engineering practice and workmanship. Use of the information contained herein shall not constitute a representation, guarantee, or warranty of any kind by the City, or its officers and employees, of the adequacy or safety of any storm water management structure or use of land. Nor shall the approval of a Storm water Management Plan and the issuance of storm sewer permits imply that land or land uses permitted will be free from damages caused by storm water runoff. The degree of protection required by the criteria and performance standards referenced herein is considered reasonable for regulatory purposes and is based on historical records, engineering, and scientific methods of study. Larger storms may occur or storm water runoff heights may be increased by man-made or natural causes. This information, therefore, shall not create liability on the part of the City or any officer or employee with respect to any legislative or administrative decision lawfully made hereunder.